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(71) Applicant *(for all designated States except US)*: MINIFLEX LIMITED [GB/GB]; The Black Granary, Station Yard, Framlingham, Woodbridge, Suffolk IP13 9EE (GB).

(72) Inventors; and
(75) Inventors/Applicants *(for US only)*: JENKINS, Peter, David [GB/GB]; Cherry Tree Farm, Brook Lane, Framlingham, Woodbridge, Suffolk IP13 9RH (GB). BENTON, Simon, Charles, Tristan [GB/GB]; Pippins, Tower Road, Felixstowe, Suffolk IP11 7PR (GB).

(74) Agent: COPP, David, Christopher; Dummett Copp & Company, 25 The Square, Martlesham Heath, Ipswich, Suffolk IP5 7SL (GB).

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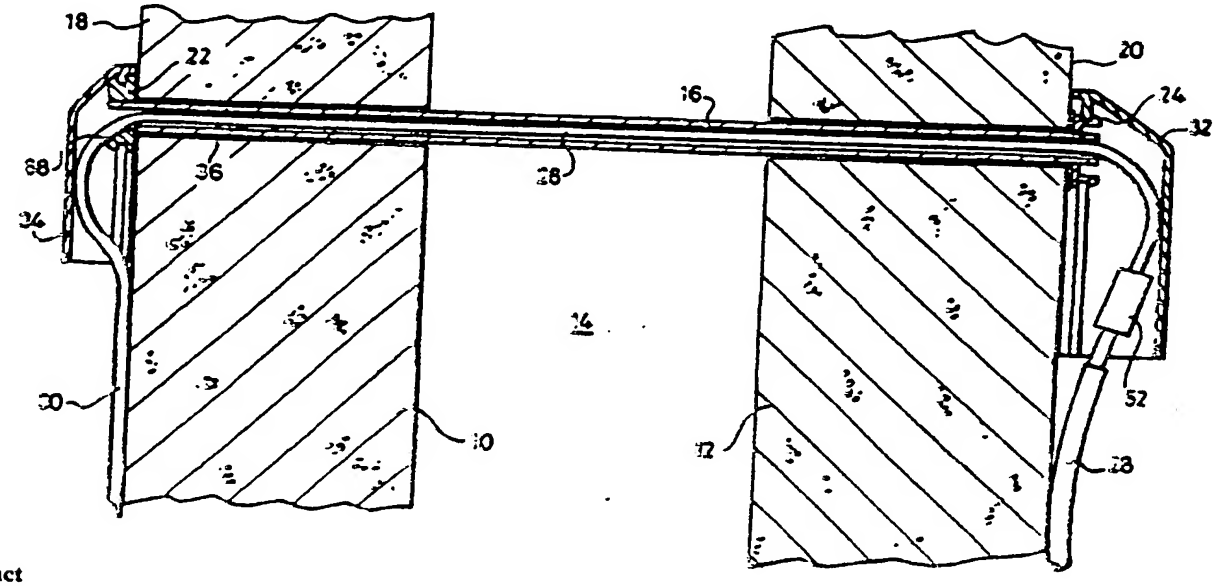

(57) Abstract

A method of passing a cable through a wall (10, 12) comprises the steps of drilling a hole through a wall and inserting a tube (16) so that the tube projects from the wall at both sides of the wall. A head (22, 24) is then mounted on opposite ends of the tube to trap the tube so that the tube cannot move axially in the wall. The heads are formed so that they present no obstruction to the internal bore of the tube. Finally, a cable (26) is passed through the internal bore of the tube.

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PASSING CABLES THROUGH WALLS

This invention relates to a method of and to apparatus for passing cables through walls. The invention is particularly, but not exclusively, suitable for passing electrical, telecommunications or date communications cables through the walls of buildings to provide a service to the occupiers of the buildings.

The cables may be electrically conductive metal cables as used for power supplies and for telecommunications lines, or they may be optical fibre cables. The invention has particular applicability for passing optical fibre cables through walls.

According to the invention, there is provided a method of passing a cable through a wall of a building, the method comprising the steps of drilling a hole through a building wall, inserting a tube so that the tube projects from the building wall at both sides of the building wall, mounting a head on opposite ends of the tube to trap the tube so that the tube cannot move axially in the building wall, the heads presenting no obstruction to the internal bore of the tube, and passing a cable through the internal bore of the tube.

The tube may have an initial length longer than the thickness of the building wall, and that part of the tube projecting on one or both sides of the wall after mounting of the heads may be cut off.

A compressible washer may be placed between each head and the adjacent surface of the building wall, to provide a dust and/or watertight joint.

A cap may be mounted on at least one end of the tube, to

guide a cable leading into or out of the tube away from the end of the tube. The cable may be an optical fibre cable.

The invention also extends to apparatus for passing a cable through a wall, the apparatus comprising a tube for insertion into a hole drilled through a wall, the internal bore of the tube being adapted to accommodate the cable to be passed through the wall, the tube having a first head at one end to limit the insertion of the tube into the hole and the apparatus including a second head which is able to slide onto and along the external surface of the tube, the apparatus also including means for retaining the second head in a desired position along the length of the tube.

The tube is preferably a plain walled tube. Where the tube is to bridge a cavity wall of a building, the central portion of the external surface of the tube may have a ridged surface to ensure that any condensation forming in the wall cavity collects in droplets and drips off the tube.

The apparatus may include compressible washers to be fitted between each head and the adjacent surface of a building wall, so that when the apparatus is in place, the washers are compressed to provide a seal with the wall surface.

The first head is preferably fixed to the tube and is flush with one end of the tube. The junction between the tube and this fixed head may include a radiused path, possibly in the form of a flared end, for leading a cable out from the end of the tube at a predetermined radius. The first head may be formed as a moulded component with a tubular portion for mating with the tube, to form a

continuation of the tube internal bore.

The second head is preferably in the form of a disk with an aperture large enough to slide over the external surface of the tube, and the retaining means may be a sprag-tooth clip which can be moved in one direction along the tube, but which resists removal in an opposite direction. The second head may include a recess for accommodating this clip.

The apparatus may also include end caps for one or both ends of the tube, the caps being adapted to guide a cable from the end of the tube to a position where it extends flat along a surrounding wall surface. The end caps and the first and second heads are preferably formed to enable the caps to clip on to the heads of the tube, in a removable manner.

The invention will now be further described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 shows a section through a cavity wall into which apparatus in accordance with the invention has been installed; and

Figures 2-10 show sequential stages in the passing of a cable through a wall in accordance with the method of the invention.

Figure 1 shows a double skinned wall with two brick skins 10, 12 on either side of a cavity 14. A tube 16 extends from the wall internal surface 18 to the wall external surface 20 and has a first head 22 fixed to the tube 16 at the end of the tube which will lie at the internal surface 18, and a second head 24 fixed to the tube at the

external surface 20 of the wall. An optical fibre cable 26 passes through the tube 16 from the external surface 20 to the internal surface 18 of the wall. The cable is routed along the external wall surface 20 at 28, and along the internal surface 18 of the internal wall at 30. The entry of the cable 26 to the tube 16 and the exit of the cable from the tube 16 are both protected by respective end covers 32 and 34.

Further features of the apparatus will become apparent from the following description of its installation.

The first stage in installation is to drill a hole 36 in the wall. The hole should go right through the wall from one side to the other. The hole diameter 38 should be slightly larger than the diameter of the tube 16. For example if the hole diameter 38 is 12 mm, the hole can receive a tube 16 of 11 mm diameter.

After the hole has been drilled, a tube 16 with a fixed head 22 at one end is pushed into the hole from the internal wall surface 18. A compressible washer 40 is placed against the internal surface of the wall, and the tube is pushed in until the washer 40 is compressed against the wall surface 18.

The next stage of operation takes place at the external wall surface 20. It will be seen that the tube 16 is now projecting a significant distance beyond the wall surface. The first thing that happens on this side of the wall is that a second compressible washer 42 is placed over the tube. A movable head 44 follows the washer, and a metal sprag-tooth clip 46 is then placed over the tube. The clip 46 can only slide over the tube in one direction, and cannot slide back. By holding the free end of the tube 16, the washer 42 and the head 44 can be pushed up to

butt against the wall surface 20, the clip 46 can be moved along the tube so that the head 44 is fixed in place. The tube will then be immovably held in the wall. It will be seen that the head 44 has an annular recess 48 into which the clip 46 is received in the final position shown in Figure 5.

When the three components 42, 44 and 46 are in their final position, the free end 16a of the tube 16 is cut off with a suitable tool 50.

Having now secured the tube 16 in the wall, the next stage is for the cable 26 to be introduced. The cable end will normally be fed into the tube 16 from the inside of the building, through the head 22 as shown in Figure 6. When the end of this length of cable reaches the outside of the building it will be connected to an external cable bringing the service to that building by way of a connector 52.

The final stage in assembly is the fitting of an end cover 54 to provide a tidy finish to the cable entry and at the same time to control the degree of bending of the cable 26. The fixed head 22 has a circumferential groove 56.

The face of the cover 54 which will be in contact with the wall is shown in Figure 10. This face has a webb 58 set back from the edge 60. In this webb 58 there is a shaped aperture 62 and a slot 64. The width of the slot 64 is just greater than the diameter of the cable 26, and the lower part of the aperture 62 has a diameter greater than that of the head 22 whilst the top part of the aperture is narrower and is designed to enter into and engage with the groove 56 on the head 22. The cover will then be put in place by offering it up to the head 22 with the lower, larger diameter portion of the aperture 62 in line with

the head 22, and with the cable 26 entering the slot 64. When the cover is lying against the wall, the final stage involves a downward movement as indicated by the arrow 66 which results in the cover moving so that the edges of the upper part of the aperture 62 engage in the groove 56 to retain the cover.

Finally, as shown in Figures 8 and 9, the cable 26, 28 will be secured to the respective wall by clamps 70.

Where the cable 26 exits the tube (on both sides of the wall), it has to be routed through a 90° angle to lie along the wall surface. Optical fibre cable is limited in the bend radius to which it can be subjected without degrading its function. It will be seen from Figures 1 and 3 in particular that the head 22 has a radiused recess 68 to permit the necessary bending of the cable 26 to begin within the tube 16 so that the projection of the cover 34 from the wall 18 is as small as possible. The cable is constrained by the cover so that it is bent through the smallest permissible radius and is then protected from any further bending.

As an alternative to a radiused recess 68 at just one position around the tube circumference, the end of the tube can be flared out at a predetermined radius to create an annular flange of suitable diameter, using hot or cold forming, or spinning techniques known to those skilled in the art.

This method of passing a cable through a wall requires little expensive equipment or materials and yet provides simple, neat and effective cable handling. It can be used not only for optical fibre cables but also for other types of cables.

Claims

1. A method of passing a cable through a wall, the method comprising the steps of drilling a hole through a wall, inserting a tube so that the tube projects from the wall at both sides of the wall, mounting a head on opposite ends of the tube to trap the tube so that the tube cannot move axially in the wall, the heads presenting no obstruction to the internal bore of the tube, and passing a cable through the internal bore of the tube.

2. A method as claimed in Claim 1, wherein the tube has an initial length longer than the thickness of the wall, and wherein that part of the tube projecting on one or both sides of the wall after mounting of the heads is cut off.

3. A method as claimed in Claim 1 or Claim 2, wherein a compressible washer is placed between each head and the adjacent surface of the wall, to provide a dust and/or watertight joint.

4. A method as claimed in any preceding claim, including the step of mounting a cap on at least one end of the tube, to guide a cable leading into or out of the tube away from the end of the tube.

5. A method as claimed in any preceding claim, wherein the cable is an optical fibre cable.

6. Apparatus for passing a cable through a wall, the apparatus comprising a tube for insertion into a hole drilled through a wall, the internal bore of the tube being adapted to accommodate the cable to be passed through the wall, the tube having a first head at one end to limit the insertion of the tube into the hole and the

apparatus including a second head which is able to slide onto and along the external surface of the tube, the apparatus also including means for retaining the second head in a desired position along the length of the tube.

7. Apparatus as claimed in Claim 6, wherein the tube is a plain walled tube.

8. Apparatus as claimed in Claim 6, wherein the central portion of the external surface of the tube has a ridged surface to allow any condensation forming in the wall cavity to collect in droplets and to drip off the tube.

9. Apparatus as claimed in any one of Claims 6 to 8, including compressible washers to be fitted between each head and the adjacent surface of a building wall, so that when the apparatus is in place, the washers are compressed to provide a seal with the building wall surface.

10. Apparatus as claimed in any one of Claims 6 to 9, wherein the first head is fixed to the tube and is flush with one end of the tube.

11. Apparatus as claimed in Claim 10, wherein the junction between the tube and the first head includes a radiused path for leading a cable out from the end of the tube at a predetermined radius.

12. Apparatus as claimed in any one of Claims 6 to 11, wherein the first head is formed as a moulded component with a tubular portion for mating with the tube, to form a continuation of the tube internal bore.

13. Apparatus as claimed in any one of Claims 6 to 12, wherein the second head is in the form of a disk with an aperture large enough to slide over the external surface

of the tube, and the retaining means is a sprag-tooth clip which can be moved in one direction along the tube, but which resists removal in an opposite direction.

14. Apparatus as claimed in Claim 13, wherein the second head includes a recess for accommodating the sprag-tooth clip.

15. Apparatus as claimed in any one of Claims 6 to 14, including end caps for one or both ends of the tube, the caps being adapted to guide a cable from the end of the tube to a position where it extends flat along a surrounding wall surface.

16. Apparatus as claimed in Claim 15, wherein the end caps are adapted to clip on to the first and second heads, in a removable manner.

17. Apparatus as claimed in Claim 15 or Claim 16, wherein the end caps have portions lying, in use, on a line which is an extension of the tube bore.

18. Apparatus as claimed in any one of Claims 15 to 17, wherein the end caps have surfaces to guide a cable towards an orientation at right angles to the line of the tube bore.

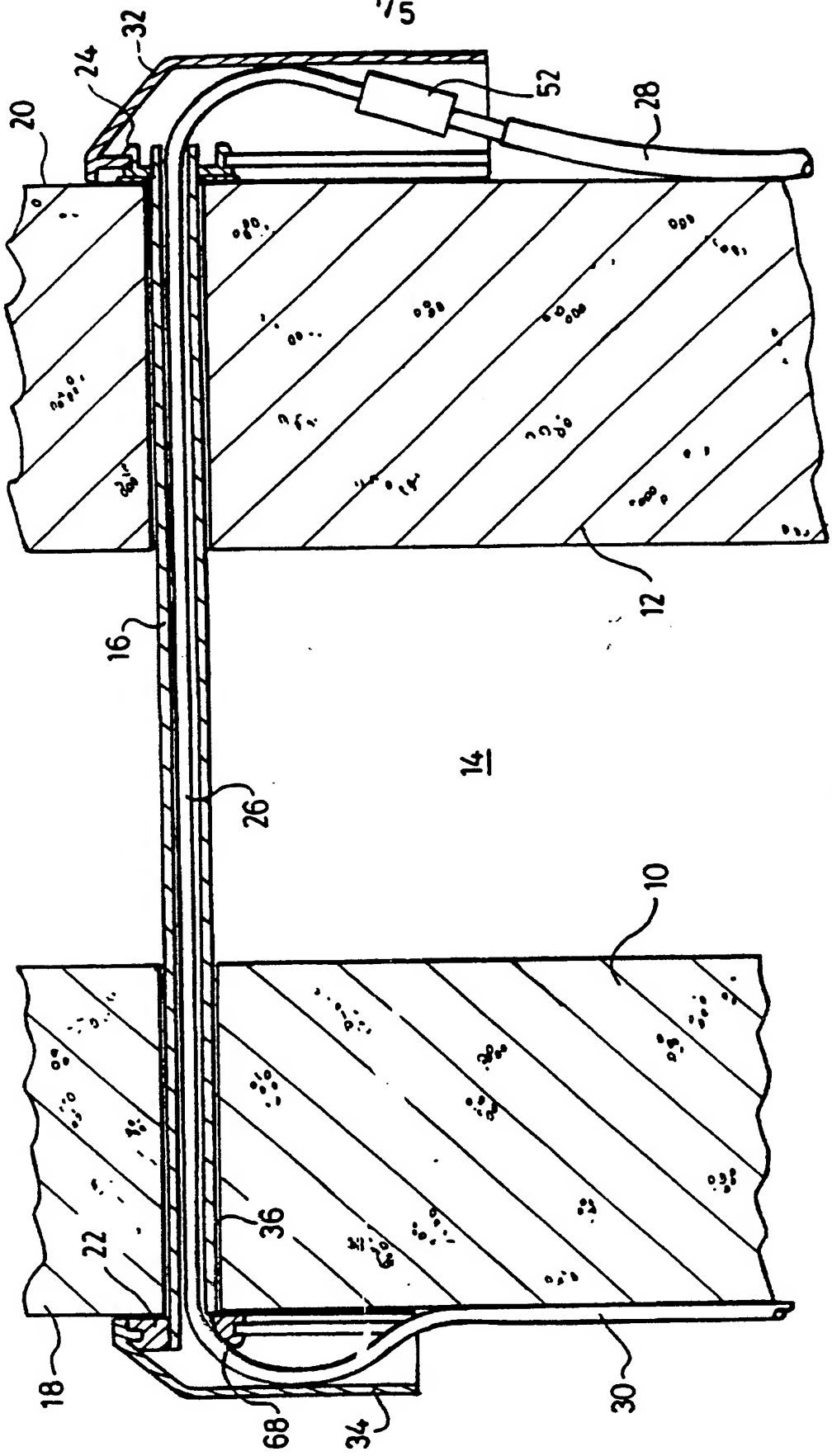

Fig. 1

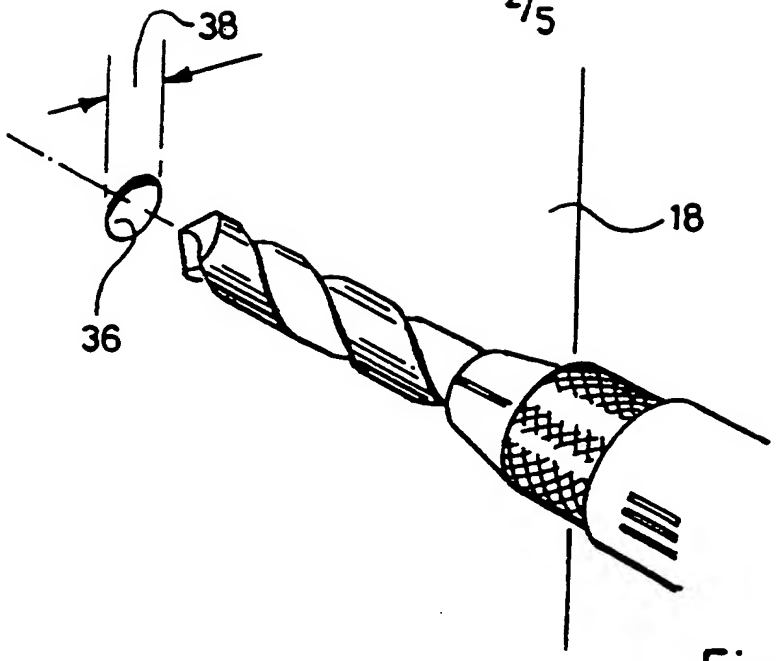

Fig. 2

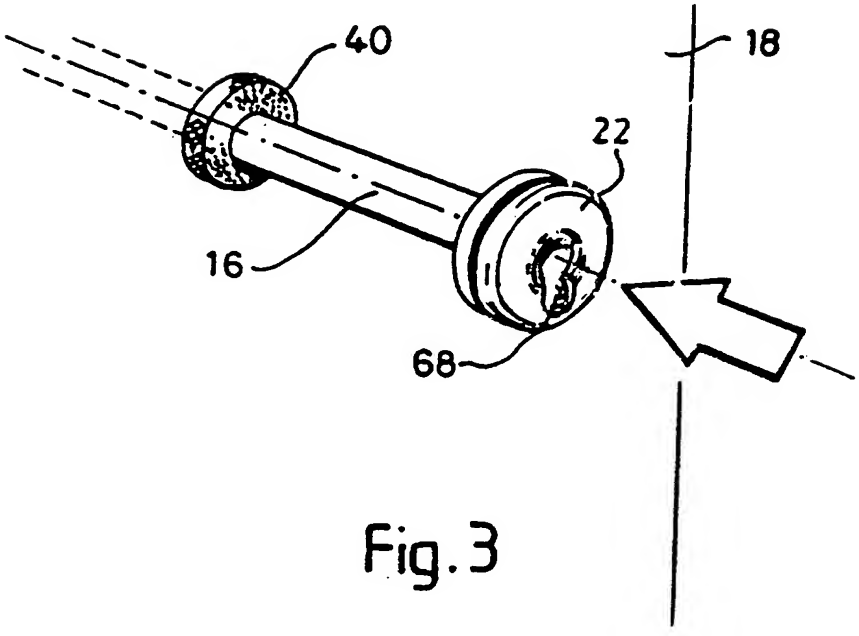

Fig. 3

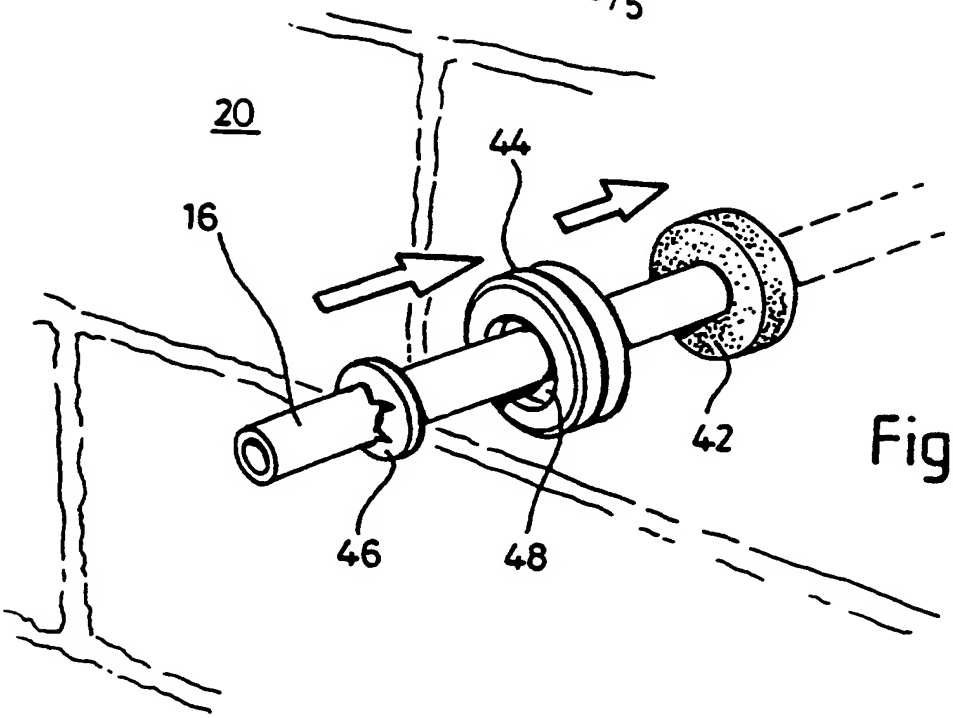

Fig. 4

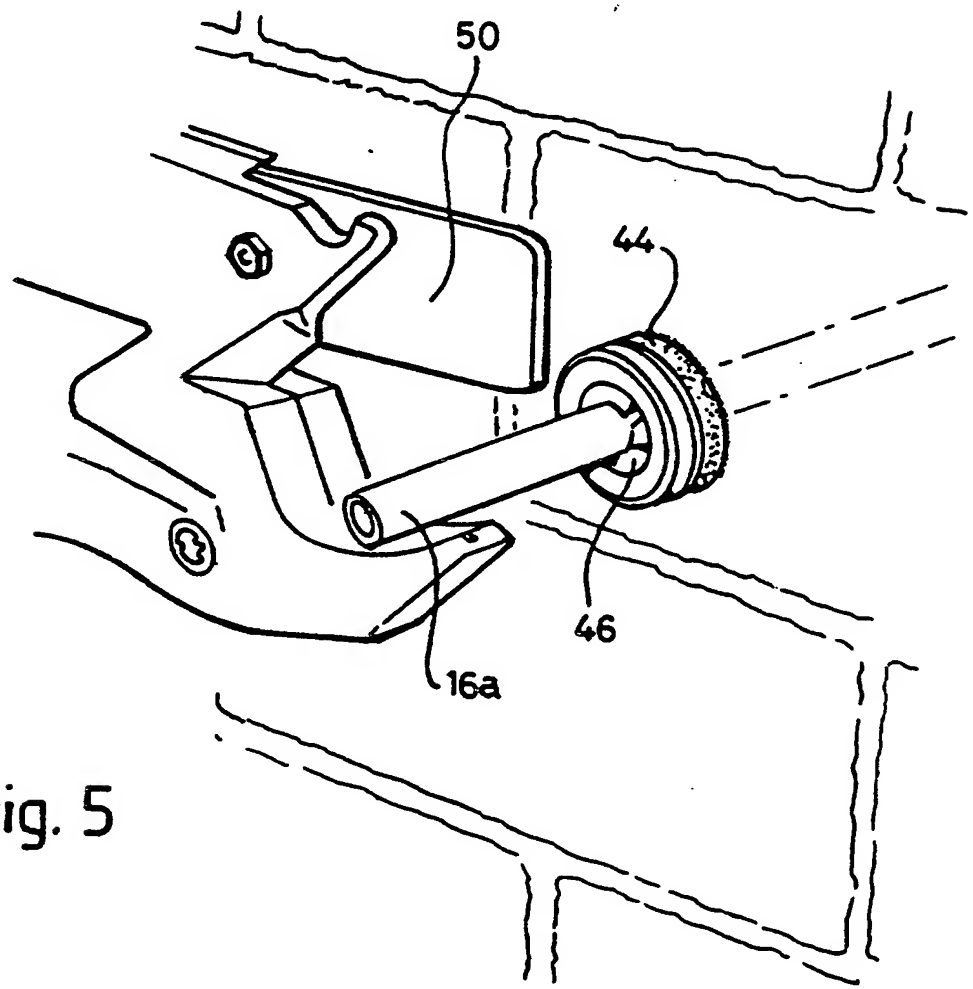

Fig. 5

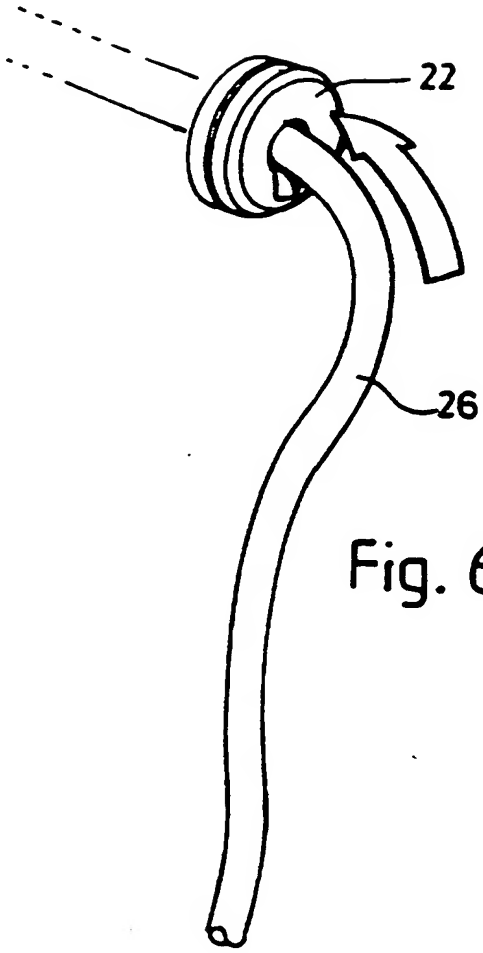

Fig. 6

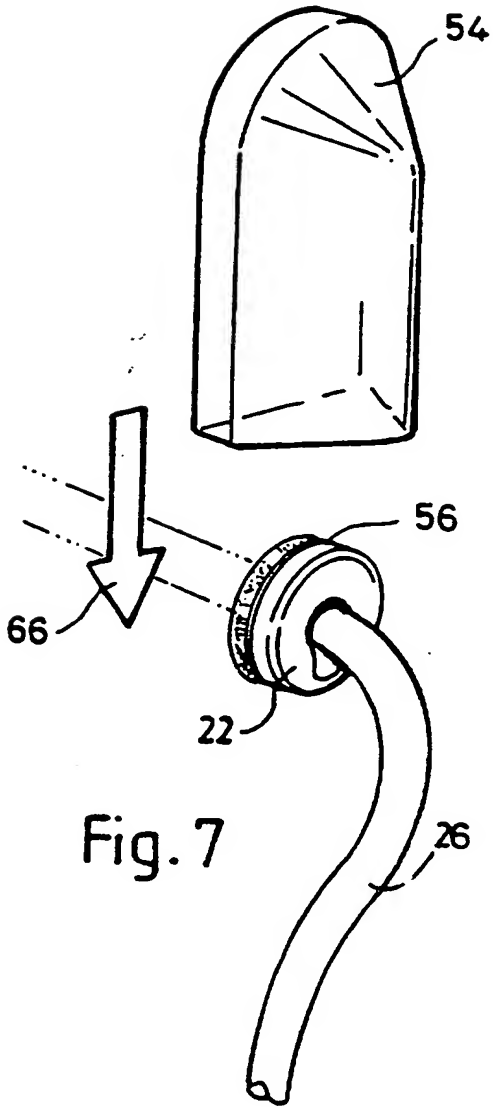

Fig. 7

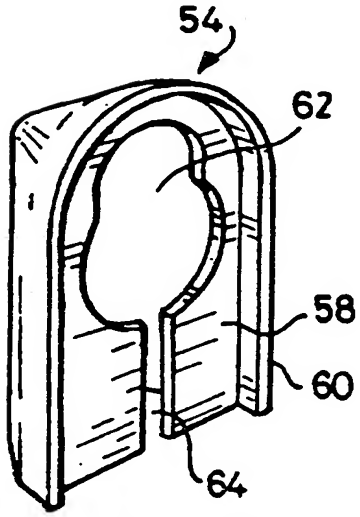

Fig. 10

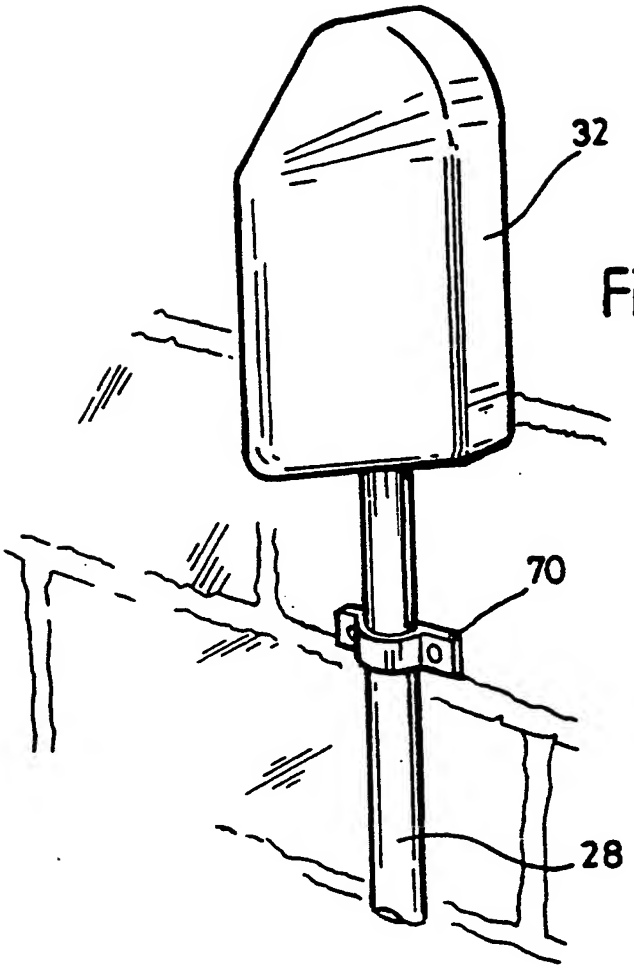

Fig 8

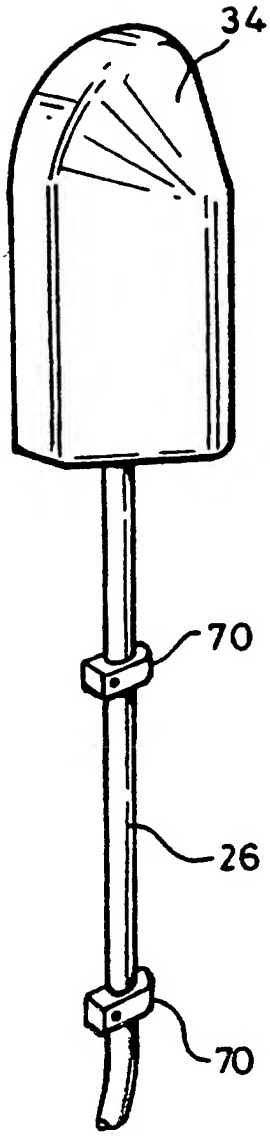

Fig 9

INTERNATIONAL SEARCH REPORT

National Application No
PCT/GB 95/02057

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H02G3/22 G02B6/44

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 H02G G02B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE,A,37 10 194 (VOGELSANG & SICHERT) 13 October 1988 see column 2, line 39 - column 2, line 67; figure 1	1,5
X A	EP,A,0 305 723 (WALTER ROSE GMBH) 8 March 1989 see column 3, line 54 - column 4, line 23; figure 1	6 1
A	FR,A,2 417 198 (CENTRAC S.A.) 7 September 1979 see page 2, line 6 - page 2, line 18; figure 1	1,6

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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INTERNATIONAL SEARCH RÉPORT

Information on patent family members

Ir ıtional Application No
PCT/GB 95/02057

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE-A-3710194	13-10-88	NONE	
EP-A-0305723	08-03-89	DE-A- 3729665 DE-A- 3881308	23-03-89 01-07-93
FR-A-2417198	07-09-79	NONE	